was found that the computed combustion temperatures derived from the heat capacity of the gases in the fuel bed agreed very closely with the observed temperatures. This would appear to indicate that a portion of the air supply, instead of passing up through the fuel, passed up the walls of the firebox. This conclusion was borne out by the writer's recollections of fires which seemed to burn faster close to the wall than they did in the center of the grate and of clinkers occurring along the walls, and fused to them, when the central portion of the fuel bed was free from clinkers. This last would seem to indicate a sort of an air-blast or oxidizing-zone effect close to the walls, strong enough to solidify the viscous ashes.

Another indication of the possibility of the air passing up between the wall and the fuel bed lies in the fact that the CC>2 in a number of the tests had a curve with two peaks. One was a high peak with low CO, after which came a steady decrease with an increase in CO, this valley being followed by an increase in C02 (and a decrease in CO) to a low peak; then there was another drop in the C02. The last drop in C02 only showed in a few cases, and might be an error as it was very slight.

The tabulations on p. 322, of the results with a 12-inch fuel bed summarize the combustion results attained:

The total weight of air required for the burning of 1 Ib of combustible will vary from 11.5 to 15 Ib and will have a volume at ordinary temperatures of from 144 to 187 cu ft. But the amount of air that can be forced up through the fuel bed is much less. The specific gravity of coal will average about 1.20 and a cubic foot of coal as fired will weigh from 40 to 50 Ib. From this it will be seen that the volume of the voids will be between 33 and 45 per cent of the mass and this will also give the proportion of the

fuel bed area through which the air must be forced. The temperature of the fuel bed and of the gases leaving it will be about 1400° C. and the gases will have an impressed velocity. A formula might be devised to give the ash pit pressure required for burning a given weight of fuel per unit of area, but there are so many variables that it would be of comparatively little use. The limit of the ash pit pressure is reached when the ascending volume of air forced through the fuel is sufficient to keep it floating. Such an intense draft pressure, however, would tend to carry unburned fuel away from the grate.